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# CHILD MORTALITY WITH REFERENCE TO THE HIGHER EDUCATION OF PARENTS.

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By WM. G. LENNOX, M.D.

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The more highly educated groups of the population show much lower marriage and birth rates than the general population. Only one third to one half of the graduates of eastern women's colleges marry, whereas more than two thirds of the women in New England, aged 15 years and over, are married. The graduates who do marry bear, on the average, but one child each. Although western college women make a better showing than this, and although the reproductive rate of men graduates is about twice that of women, the college educated group, as a whole, falls far short of reproducing itself.

The results of numerous studies on which these statements are based are summarized in a recently published book (1). One example only need be cited. Graduates of Syracuse University, in 1917, 16 to 25 years after graduation, reported as follows: percentage of graduates married, women 48 per cent., men 73 per cent.; surviving children per graduate, women one third of a child, men three fourths of a child. There must, of course, be more than two children who reach maturity per graduate, if the group is to do its share towards race maintenance.

Is the low reproductive rate of the more highly educated classes offset to any extent by a low death rate of their children? The Registrar General of England and Wales (2, 3) has published data concerning birth and infant death rates of the various occupational groups of the population. The figures for a few of these groups, arranged in the order of birth rates, are presented in Table 1.

Inspection of the first column shows that the day laborers have more than twice as many new mouths to feed as the professional groups. Column two shows that infant death rates in various groups also differ markedly and in a roughly parallel direction with the birth rates. Column three gives the excess of birth rates over infant death rates. For general laborers this excess is 100, for farmers 73, for doctors 64, for clergymen 43, for teachers 37. This comparison of different rates in different years probably would not be commended by the

Registrar General. It helps, however, in the answer of our question, for it indicates that lower death rates only partially offset the lower birth rates among the better educated classes.

TABLE 1.

*Birth and infant mortality rates in England by occupation of fathers.*

| Occupation of fathers. | No. births per 1,000 married males under 55 (1911). | No. infant deaths per 1,000 births (1912). | Excess of birth rate over infant death rate. |
|---|---|---|---|
| General laborers | 267 | 167 | 100 |
| Carpenters | 150 | 101 | 49 |
| Farmers | 148 | 75 | 73 |
| Clerks | 141 | 81 | 60 |
| Dentists | 125 | 73 | 52 |
| Doctors | 103 | 39 | 64 |
| Lawyers | 102 | 46 | 76 |
| Clergymen | 99 | 56 | 43 |
| Teachers | 95 | 58 | 37 |
| Private means | 88 | 50 | 38 |
| All occupations | 162 | 125 | 37 |

In America evidence has been presented concerning the literacy of parents and its effect on child mortality, but little study has been made of the effect of higher education or of medical education of parents on child mortality. The writer (4, 5) has made a study of the health of 1,489 missionary families in China and Japan. In order to obtain data for comparison with this group, question blanks were sent to a large number of persons in this country. Certain of the information received, not used in the previous studies, bears on the question in hand and is presented in the following tables.

To secure the facts desired, the married members of the following groups of persons were addressed: (1) ministers of Methodist Episcopal churches living in seven western states, (2) members of four churches in Denver and Colorado Springs, (3) the faculty members of the University of Denver and Colorado College, and the alumni of the latter institution, (4) most of the physicians practising in Colorado. Two thousand four hundred families were addressed of whom 939 replied. The occupations of the husbands and their approximate proportionate numbers are as follows: ministers 35 per cent., physicians 24 per cent., other professional men (lawyers, teachers, etc.) 13 per cent., business men, clerks, etc., 18 per cent., skilled laborers (carpenters, plumbers, etc.) 10 per cent. Information was not obtained concerning the economic condition of the families reporting. It is believed, however,

that there was no great difference in this respect among the various occupational groups. All those in Denver and Colorado Springs lived in single house residential districts. The child mortality rate for families living in and outside Denver was practically the same.

TABLE 2.

*Number of children per family and the number of years which parents attended school by occupation of husband.*

| Occupation of husband. | Number of families.* | Average no. years married. | Average no. children per family. | Percentage of childless marriages. | Average number years of schooling. | | |
|---|---|---|---|---|---|---|---|
| | | | | | Wife. | Husband. | Both. |
| Minister | 318 | 18.1 | 2.46 | 12.6 | 12.3 | 15.3 | 27.6 |
| Doctor | 218 | 18.1 | 2.16 | 15.6 | 12.9 | 17.5 | 30.4 |
| Other professions | 121 | 12.9 | 2.25 | 11.6 | 14.2 | 16.7 | 30.9 |
| Business | 169 | 17.1 | 2.20 | 13.0 | 11.6 | 11.7 | 23.3 |
| Skilled labor | 90 | 18.1 | 2.49 | 13.3 | 10.0 | 9.9 | 19.9 |
| Not stated | 23 | — | 2.43 | 22.0 | 10.5 | 11.4 | 21.9 |
| Whole group | 939 | 18.0 | 2.33 | 13.7 | 12.4 | 14.8 | 27.2 |

* In this and other tables the 49 remarriages are counted as separate marriages.

Table 2 gives certain preliminary information concerning the occupational groups. The average of 2.3 children per family compares well with the average of 2.7 children born to native-born white women of the United States who have been married from 10–19 years (6).

If we tabulate size of family by the years of schooling of the wife (Table 3) we find the average number of children a fourth less, if the

TABLE 3.

*Number of children born per family by the number of years which wife attended school.*

| Number of years wife attended school. | Number of families. | Average number of children. | Percentage of childless marriages. |
|---|---|---|---|
| 8 or less | 117 | 2.69 | 13.7 |
| 9–12 | 353 | 2.78 | 11.9 |
| 13 or more | 407 | 2.13 | 13.8 |
| Years not stated | 62 | 2.14 | 22.6 |
| Whole group | 939 | 2.33 | 13.8 |

wife has had more than a high school education. The average number of children for these women, 2.13, is the same (2.14) as occurs in the families of 3,022 faculty members of American universities (7).

The next four tables present the facts concerning deaths in doctors'

families, as contrasted with other families living in much the same circumstances, but in which parents have had no medical education.

TABLE 4.

*Proportion of pregnancies ending fatally, by occupation of husbands.*

| Occupation of husband. | Total no. pregnancies. | Number of deaths per 1,000 pregnancies. | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Foetal deaths. | | | Deaths after birth. | | | Total no. deaths. |
| | | Miscarriages. | Stillbirths. | Total. | 0–1 year. | 0–5 years. | All ages. | |
| Minister | 892 | 94 | 23 | 117 | 50 | 72 | 105 | 224 |
| Doctor | 556 | 137 | 16 | 153 | 45 | 59 | 95 | 248 |
| Other professions | 303 | 89 | 10 | 99 | 23 | 43 | 56 | 155 |
| Business | 421 | 90 | 24 | 114 | 33 | 69 | 81 | 195 |
| Skilled labor | 246 | 73 | 12 | 85 | 37 | 69 | 126 | 211 |
| Not stated | 57 | 17 | 0 | 17 | 70 | 175 | 334 | 351 |
| Whole group | 2,475 | 99 | 19 | 118 | 42 | 64 | 100 | 218 |

Table 4 and Figure 1 show foetal and child death rates, based on the number of pregnancies. For the whole group foetal deaths exceed deaths of children born alive in the proportion of 118 to 100. The doctors in this group do not make as good a showing, in relation to other professional groups, as doctors in England. The reason for the high foetal mortality in doctors' families will be discussed later.

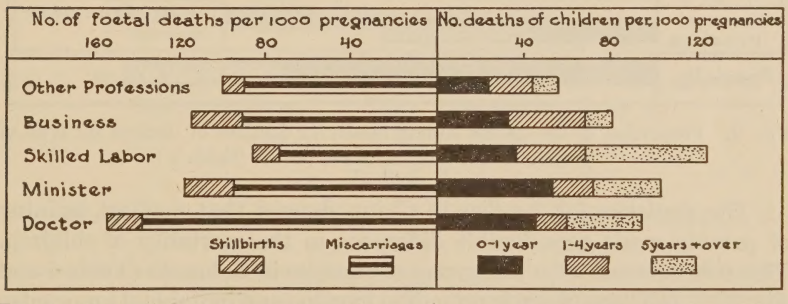


FIG. 1. Proportion of pregnancies ending fatally by occupation of husbands. (Illustrating Table 4.)

In Table 5, part of the same data is expressed in the more familiar terms of deaths per 1,000 living births. In addition, the group of doctors is subdivided into the specialties (bottom portion of Table 5 and Fig. 2). Rates in these doctors' families are especially high among

TABLE 5.

*Proportion of live births ending fatally by occupation of husbands and of doctors by type of practice.*

| Occupation of husband. | Number of living births. | Number of deaths per 1,000 living births. | | |
|---|---|---|---|---|
| | | 0–1 year. | 0–5 years. | All ages. |
| Ministers | 787 | 57 | 82 | 120 |
| Other professions | 273 | 25 | 48 | 62 |
| Business | 373 | 37 | 56 | 91 |
| Skilled labor | 225 | 40 | 76 | 138 |
| Occupation not stated | 56 | 71 | 178 | 339 |
| All doctors | 471 | 53 | 70 | 113 |
| Medicine or surgery | 162 | 12 | 50 | 74 |
| General practice | 207 | 43 | 53 | 101 |
| Specialty | 102 | 137 | 137 | 196 |
| Total | 2,185 | 48 | 72 | 113 |

those engaged in a specialty. Unfortunately, the numbers dealt with are too small to make this more than an interesting observation. Larger figures are needed for confirmation.

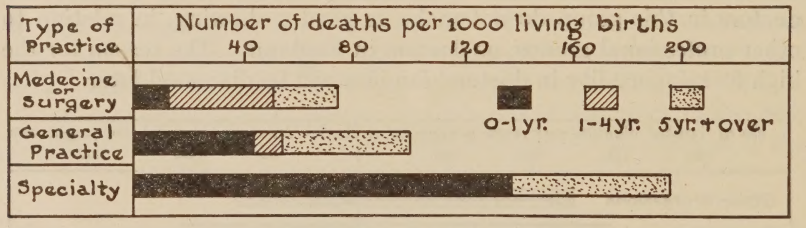


FIG. 2. Proportion of live births ending fatally in families of doctors by type of practice. (Illustrating lower part of Table 5.)

The statistics for families in China showed that medical training of parents made considerable difference in the mortality of children. This is in contrast with this group of families in Colorado (Table 6 and Fig. 3). In China there is no public hygiene and individual knowledge of disease prevention is a more important factor in the preservation of life than it is in America.

Table 4 showed a surprisingly high miscarriage rate among the wives of doctors. Table 7 contrasts these figures with those obtained by Schwartz (8), from poor families in New York City. The less the medical knowledge of the parents, the lower is the miscarriage rate.

TABLE 6.

*Mortality of children with reference to medical education of parents residing in the United States and in China.*

| Families resident in | Medical training of parents. | No. of living births. | Number of deaths per 1,000 living births. | | |
|---|---|---|---|---|---|
| | | | 0–1. | 0–5. | All ages. |
| United States | Mother or both parents | 95 | 63 | 94 | 105 |
| | Father only | 471 | 53 | 70 | 113 |
| | Neither parent | 1,619 | 45 | 72 | 114 |
| China | Mother or both parents | 398 | 45 | 73 | 85 |
| | Father only | 379 | 65 | 111 | 124 |
| | Neither parent | 2,427 | 63 | 120 | 151 |

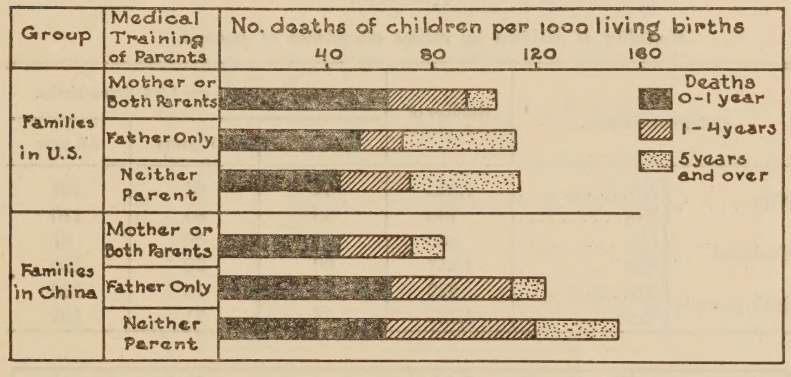


FIG. 3. Mortality of children with reference to medical education of parents in the United States and in China. (Illustrating Table 6.)

TABLE 7.

*Percentage of foetal and infant deaths in this group and a group of poor families in New York City.*

| Group. | Total no. pregnancies. | Number of deaths per 1,000 pregnancies. | | | |
|---|---|---|---|---|---|
| | | Miscarriages. | Stillbirths. | Total foetal deaths. | Infant deaths. |
| Doctors of this group | 556 | 137 | 16 | 153 | 45 |
| All others of this group | 1,919 | 87 | 19 | 106 | 41 |
| Poor families in New York City | 27,711 | 81 | 15 | 96 | 117 |

Probably this is because among the ignorant many miscarriages go unrecognized or are forgotten. This view is strengthened by further figures from the New York group.

In families in which both parents were illiterate, infant deaths per 1,000 living births numbered 203, but miscarriages only 75. On the other hand, in families in which one or both parents were literate, infant deaths were only 125, but miscarriages were 85. These observations suggest that miscarriage rates are really much higher than commonly reported.

The three remaining tables deal with the health of the children in relation to the length of time which parents have spent on their own education.

Table 8 and Figure 4 present the evidence concerning child mortality,

TABLE 8.

*Mortality of children by college attendance of parents.*

| College attendance. | | Number of living births. | Number of deaths per 1,000 living births. | | |
|---|---|---|---|---|---|
| | | | 0–1 year. | 0–5 years. | All ages. |
| Wife | No | 1,362 | 44 | 64 | 101 |
| | Yes | 739 | 55 | 85 | 110 |
| Husband | No | 882 | 31 | 50 | 87 |
| | Yes | 1,257 | 60 | 90 | 130 |
| Both parents | No | 822 | 48 | 75 | 128 |
| | Yes | 1,325 | 48 | 71 | 102 |

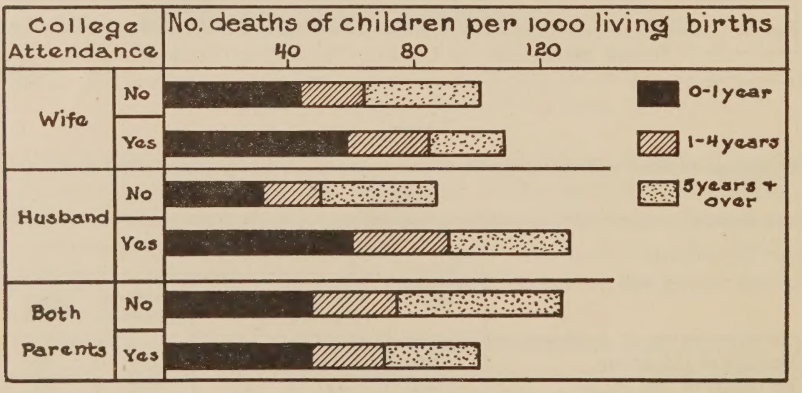


FIG. 4. Mortality of children by college attendance of parents. (Illustrating Table 8.)

TABLE 9.

*Mortality of children and causes of death, by number of years parents attended school.*

| Parent. | Number years school attendance. | Number of living births. | Number of deaths per 1,000 living births. | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Age 0–1 year. | Age 0–5 years. | All ages. | *a.* From infectious diseases. | *b.* From prematurity, birth defect, and malnutrition. | Ratio of Column *a* by column *b.* |
| Wife | 8 or less | 315 | 51 | 79 | 130 | 21 | 1 | 21. |
| | 9–12 | 882 | 45 | 64 | 99 | 31 | 13 | 2.3 |
| | 13–16 | 760 | 49 | 72 | 101 | 30 | 19 | 1.6 |
| | 17 or more | 103 | 68 | 107 | 155 | 8 | 4 | 2. |
| Husband | 8 or less | 220 | 36 | 59 | 105 | 12 | 1 | 12. |
| | 9–12 | 383 | 49 | 78 | 140 | 22 | 9 | 2.4 |
| | 13–16 | 884 | 47 | 74 | 112 | 30 | 11 | 2.7 |
| | 17 or more | 652 | 49 | 67 | 101 | 29 | 17 | 1.7 |
| Both parents | 16 or less | 162 | 55 | 92 | 135 | 12 | 0 | $\alpha$ |
| | 17–24 | 506 | 47 | 70 | 125 | 24 | 9 | 2.7 |
| | 25–32 | 889 | 52 | 70 | 100 | 29 | 15 | 1.9 |
| | 33 or more | 475 | 44 | 72 | 95 | 22 | 12 | 1.8 |

based on the college attendance or non-attendance of parents. Rates are a little higher in families in which one parent, especially the father, has attended college; a little lower in families in which both parents have attended college.

Table 9, based on years of school attendance of parents, shows much the same thing as Table 8. Only in case both parents have had the benefit of higher education is there evidence of lowered child mortality, and even here the difference is small. The last three columns of Table 9 deal with the cause of death of children dying at all ages. Where schooling of a parent has been eight years or less, a disproportionate number of children die of some infectious disease. Children of parents who have had more than eight years of schooling each are more likely to die of some developmental cause or from birth injury or malnutrition.

In contrast with the preceding tables, which show that in the group studied, higher education of a parent does not result in lower mortality among the children, Table 10 shows the better general

TABLE 10.

*Percentage of children whose general health has been robust by number of years parents attended school.*

| Number of years of school attendance.* | Wife. | Husband. | Both parents. |
|---|---|---|---|
| 8 or less | 27.3 | 28. | 27.3 |
| 9–12 | 35.8 | 32.4 | 31.3 |
| 13–16 | 45.7 | 38.1 | 39.0 |
| 17 or more | 49. | 47.6 | 49.3 |
| Whole group | 39.4 | 39.1 | 39.1 |

* School attendance for both parents is double the figures in this column.

health of living children whose parents have had more extended education.

## Conclusions.

Statistics from a group of 939 families, reporting 2,475 pregnancies, are tabulated with reference to the medical and general education of parents.

1. Families in which the father is a doctor do not have lower mortality rates among children than the other professional or business groups. The small group of doctors engaged in a specialty show unusually high rates. Miscarriage rates for doctors' wives are high, probably because reports from other occupational groups are falsely low.

2. College attendance of a parent or extended years of schooling is accompanied by slightly higher mortality rates of children. In case both parents have attended college or had extended schooling, there is a slightly lowered mortality rate. A disproportionate number of children whose parents have had less than a grammar school education have died of infectious diseases.

3. The more highly educated parents report a larger proportion of living children who are in robust health.

The above conclusions apply to the comparatively small group of persons here studied. The question raised is of sufficient importance that further evidence should be secured from much larger groups in various sections of the country.

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